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Application of flexible Kyoto mechanisms for renewable energy projects in Baltic states

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Abstract

The article analyses the use of flexible mechanisms under the Kyoto protocol in Baltic States and investigates the perspectives of these tools in the future. The results of the first phase of joint implementation (JI)–activities implemented jointly (AIJ) in Baltic States was overviewed in the article. The stages of JI process, activities and responsible institutions necessary for the implementation of JI projects are addressed in the paper. The main aim of the analysis conducted is to assess the future perspectives for JI projects in Baltic States taking into account EU accession and implementation of EU Linking directive. The institutional structure and legal framework for the implementation of JI in Baltic States was analyzed and measures and institutions necessary for the implementation of these projects were prescribed. The experience of Testing Ground Facility in Baltic Sea Region is presented in article and recommendations for the enhancement of JI in Baltic States were developed based on analysis conducted.

Keywords: Renewable energy source; Flexible Kyoto mechanisms; JI

Contents

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1. Introduction

The Kyoto protocol to the United Nations Framework Convention on Climate Change (UNFCCC) specifies greenhouse gas (GHG) emissions reduction targets for countries included in Annex I of the Convention. These emission reductions have to be achieved by 2008–2012. The Kyoto protocol includes four "flexibility" instruments, which enable countries to achieve these reductions with other states. The intention of the mechanisms is to allow emission reductions at the lowest possible costs. The protocol mechanisms include: emissions trading (ET); joint implementation (JI); the clean development mechanism (CDM). Only two of these mechanisms—emissions trading and JI—can be used within Annex I by all 38 industrialized or transition countries, including Baltic States. CDM is a mechanism to be implemented only between an Annex I country and a developing country. In addition, two of these mechanisms—JI and CDM—are project-based and envision investment in projects to reduce GHG emissions. The JI mechanisms have not yet entered a phase where investor and recipient countries can transfer emission credits. Nevertheless, experience in implementing such projects is being gained through a pilot phase known as activities implemented jointly (AIJ).

The paper presents the overview of experience of Baltic States in implementing AIJ projects in the field of sustainable energy. The experience of Baltic States in first phase of JI–AIJ provide examples of country efforts in building a national JI system to streamline investment. At the same time they illustrate the significant hurdles that governments and the Conference of the Parties to the Convention need to address to make JI investment cost effective and attractive for recipient and investor countries. In the following sections the experience and challenges of Baltic Sates in AIJ are presented.

2. Flexible Kyoto mechanisms

There are three market based climate change mitigation tools: EU GHG emission trading scheme, three flexible mechanisms (FMs) under the Kyoto protocol and green certificate trading. Very important international tools to reduce GHG emissions are FMs under the Kyoto protocol. The Kyoto protocol allows the use of three FMs: International emission trading, JI and CDM.

International emissions trading allows Parties to the Protocol who reduce emissions below their assigned amount to sell part of their emissions allowance, they can buy the extra from the Parties who have spare capacity and are willing to sell.

JI is a specific form of emission trading at project level. Annex I Parties to the Convention can undertake projects (e.g. fuel switching for a power station) with other Annex I Parties, which result in additional emission reductions in the country where the project is located. Those reductions can be used to increase the emission allowance of the Party financing the project, while the emission allowance of the Party where the project is carried out would be correspondingly reduced.

CDMs are very similar FMs like JI. The difference is that under CDM non-Annex B Parties to the Convention can undertake projects with Annex B Parties, which result in additional emission reductions in the country where the project is located.

The EU emission trading scheme is the first international emission trading scheme. The trading will be implemented independently of the Kyoto protocol but will be linked to the international emission trading and other flexible Kyoto mechanisms. In order to face coherence between international and EU emission trading related matters the linking directive was adopted. The aim of this directive is to allow the emission reduction units (ERUs) gained from JI and CDM to be accepted as equivalent to European tradable emission permits. European firms will be able to use CDM credits (called certified emission reduction units CERs) from January 2005 and JI credits (called emission reduction units ERUs) from 2008, independent of the entry into force of the Kyoto protocol.

The core element of this directive is to provide the recognition of JI and CDM credits as equivalent to EU tradable emission permits for their use within the Community scheme by operators to fulfill their obligations. Linking will increase the diversity of compliance options within the Community scheme thereby leading to a reduction of compliance costs for installations in the scheme. Linking will improve the liquidity of the European market of tradable GHG emission permits and lower the market price for them. It is estimated that annual compliance costs in the period 2008–2012 for covered installations in the enlarged EU will be reduced by more than 20%. Allowance prices in the enlarged EU with linking as proposed are estimated to be lowered by about half.

Though EU GHG emission trading scheme will be implemented in 2005 and according linking directive GHG emission credits from CDM can be transferred in tradable emission permits since 2005 and credits form JI can be transferred to tradable permits since 2008 all these three market based mechanisms will start to interact just on 2008–2010 because European-wide TGC scheme can be implemented in 1998–2010, following a report and a proposal from the European Commission in 2005.

3. Activities implemented jointly

JI is a project-based mechanism designed to facilitate contracts between a host and investor. The host company receives capital and technology, which the investing firm supplies in exchange for credits called emission reduction units (ERUs). During the period of 2008–2012, two classes of project activities generate ERUs: those that reduce GHG emissions, those that enhance carbon sinks, such as reforestation. Depending upon whether that organization acquired or transferred the ERUs, the Annex I investor and host governments increase or decrease their national assigned amounts respectively. As a result, the total of Annex I authorized GHG emissions remains constant. Currently no JI projects are being implemented and the rules are not yet clearly set. However, many countries are involved in a pilot phase called activities implemented jointly (AIJ).

AIJ and JI share at least three similarities. Both AIJ and JI intend to mobilize pools of largely private capital that invest in international projects where it is most cost-effective to do so. Like JI, AIJ is a project-based mechanism. AIJ and JI have the following common elements:

1. *Additionality* refers to whether the GHG emission reduction achieved by a JI/AIJ project (or sequestrations) constitute new or additional reductions, which would not have otherwise occurred without the investment.
2. A *baseline* refers to an estimation of what a facility's GHG emissions would have been without the AIJ or JI project.

However AIJ and JI have at least three major differences. AIJ started in 1995 and continues to operate. Unless the Parties agree to push the date forward, JI will start in 2007.

AIJ can occur between firms of any two countries that are Parties to the 1992 UN Framework Convention on Climate Change (UNFCCC). JI is more restrictive, because it will involve entities located only in industrialized countries—namely, those the UNFCCC grouped under Annex I.

The third difference is that AIJ does not allow countries to use project credits of emission reductions to offset their legal obligations undertaken at Kyoto. In contrast, the JI projects will generate ERUs that investors can use to satisfy their emissions limits. It is conceivable that upcoming negotiations might allow countries to submit AIJ projects through formal JI procedures and thereby generate ERUs.

Baltic States have quite big experience in the first stage of JI–AIJ. The main projects were developed by Sweden, Denmark and other Nordic Countries.

3.1. AIJ in Estonia

In late 1992 and early 1993, the Swedish Government initiated a program aimed at mitigating climate change through improvements in the energy systems of the Baltic States and countries in Eastern Europe. These took the form of energy efficiency measures and the increased use of renewable energy sources. The Swedish Government Programme for an Environmentally Adapted Energy System (EAES) program was actually one of the very first state level programs in the world aimed at the rapid and efficient implementation of the UNFCCC. This program was designed to conform to the AIJ criteria agreed upon at the first Conference of the Parties in Berlin in April 1995. The first pilot projects of AIJ were launched in the Baltic States, Russia and Poland. Estonia has participated in the NUTEK AIJ pilot projects from the beginning.

In 1998, the governments of Estonia and Sweden agreed on mutual cooperation in monitoring, reporting to the Climate Secretariat, and verification of the results of these 13 projects. The program was financed by special allowances from the Swedish State budget. The total program budget for the period 1993–1997 was SEK 295 million (approximately USD 42 million), of which SEK 230 million, or ~78% has been used to finance favorable investment loans, the rest being used for consultancy in the region. These significant funds were allocated to develop various types of energy projects leading to cutting GHG emissions in the above-mentioned five countries with economies in transition. The EAES program received a further SEK 350 million from the government for the following period

1998–2005. An expansion can be foreseen in the number of projects in the Russian Federation, the Barents Region in particular (Karelia and the Murmansk and Archangelsk Regions), for further developing the JI. NUTEK was assigned as the implementing authority by the government until the end of 1997. As of January 1, 1998, the new Swedish National Energy Administration (STEM) has assumed responsibility for the EAES.

From the onset, the general direction of the EAES program has comprised the following four categories of projects:

- Conversion of heat production plants from fossil fuels to the local bio-fuels.
- Reduction of heat losses in district heating systems.
- Energy efficiency in the end-use within buildings.
- Comprehensive projects, which combine all three of the above-mentioned.

Investment priorities differ slightly from those of the first stage. In recent years the program has been adjusted and is further directed towards:

- Combined fuel conversion and measures in distribution and/or end-use.
- Combined heat and power production (CHP).
- Use of waste heat from industrial production for district heating and power production.

Estonia hosted 21 AIJ projects, all implemented in cooperation Sweden. As Estonia did not set up an official AIJ officer or procedures for assessing, registering and implementing the AIJ projects have been analyzed and assessed at ad hoc bases. The AIJ projects with Sweden have been realized in the fields of fuel switch, energy efficiency, replacing outdated combustion technologies in the district heating sector, and improving energy conservation in apartment buildings. The total emission reduction for all 21 projects is estimated at about 100,000 tons of CO_2 per year. Sweden has been a pioneer among the Parties to the UNFCCC in implementing AIJ in Estonia.

To date three JI projects are implemented in Estonia—Kadrina, Tamsalu and Paide conversion to biomass projects. The preparations for three new wind generator projects have been completed and soon the construction works will start [1]. Up to now, Finland has been the most active partner for Estonia in JI projects: of six projects undersigned Finland has been the partner in four, Denmark and The Netherlands both in one project (see Table 1).

The biomass projects in Tamsalu and Kadrina: These projects were completed already in 2000 as JI pilot projects between Finland and Estonia. Both projects had the same objective—to replace the old fossil fuel fired boilers with the biomass firing ones. The new BioGrate 2.5 MW boilers were manufactured by Wärtsilä Finland OY.

Paide biomass project: This project was commissioned in 2003. The objective was to install a new 8 MW biomass firing boiler in a boiler plant in Paide city. The project partners included OÜ Pogi (private owned operator of the DH system), Wärtsilä Finland Oy BioPower and Ühispank (Estonian commercial bank). The new boiler fires wood waste, but can also utilize peat (up to 30% of total fuel input). OÜ Pogi was interested in installation of a new boiler with the target to ensure long-term economic margins, as the project was planned to stabilize the heat price and to reduce SO_2 and NO_x emissions. The Paide JI project was signed in October 2003.

Table 1
Joint Implementation projects in Estonia, as of May 2005

JI project	Developer	Capacity, MW	Status of the JI Project Agreement	CO_2 reduction, thousand tons of CO_2 eq
Between Estonia and Finland				
Paide bioenergy project	OÜ Pogi	8.0	Concluded on November 10, 2003	100.0
Kadrina bioenergy project	AS Kadrina Soojus	2.5	In preparation	17.9
Tamsalu bioenergy project	AS Tamsalu Kalor	2.5	In preparation	12.7
Pakri Wind Farm project	OÜ Pakri tuulepark	18.4	Concluded on January 09, 2004	451.0
Between Estonia and Denmark				
Türisalu Wind Farm project	OÜ Türisalu tuulepark	21.45	In preparation	462.0
Between Estonia and Holland				
Paldiski Wind Farm project	OÜ Paldiski tuulepark	50.6	In preparation	986.0

Wind park in Pakri: The wind park project being developed by OÜ Pakri Tuulepargid on achieved endorsement of the Estonian Ministry of Environment and the project was included to the Finnish CDM/JI pilot program. According to the project a wind park of 18.4 MW capacity will be put up on Pakri peninsula. The construction works will be completed by the end of 2004.

Türisalu wind park: At the beginning of 2002 Danish Energy Agency presented the first phase of the JI pilot project to be carried out together with Estonia. During the pilot phase the wind park project planned by Türisalu Tuulepargi OÜ was selected. It is planned to erect from 9 to 13 newest NEG Micon generators with the unit capacity of 2.75 MW on the territory of former Soviet Union rocket base. Denmark has proposed 3.5–4.0 € per GHG emission reduction unit.

Paldiski wind park: Senter International, the agency of Dutch Ministry of Economic Affairs, in 2000 started the *Emission Reduction Unit Procurement Tender* (ERU-PT) program which is an open tendering to purchase the ERU. ERU-PT seeks for economically feasible energy projects targeted to mitigation of climate change impact. The ERU-PT program supports the projects financially and as a result open international tendering obtains the amounts of GHG reduction, which are needed for The Netherlands to meet the international commitments. OÜ Paldiski Tuulepark proposed the project—installation of 50.6 MW wind park on Paldiski peninsula—to the ERU-PT program. ERU-PT pays up to 5 € for the reduction unit. The actual price would be agreed on during negotiations.

The FMs of Kyoto protocol facilitate the introduction of energy efficient modern technology from the highly developed countries to transition economies, particularly in energy, heating, transport and industrial sectors. The trading of GHG reduction units may direct substantial financing flows from countries where the emission reduction has been

lower than agreed. Implementation of Kyoto protocol FMs brings into Estonia investments and know-how, and facilitates the reduction of emissions into ambient air improving the state of environment and increasing the energy efficiency.

3.2. AIJ in Latvia

Latvia supported the mechanism of AIJ as a supplementary measure to reduce GHG emissions in industrialized countries. A total of 27 AIJ projects have been realized in different regions and municipalities of Latvia by the Swedish, Dutch and German governments' as well as international environmental institutions' assistance which constitutes 37.5% of all AIJ projects implemented in Central and Eastern Europe. Reported total reduction of CO_2 emissions (10 years lifetime of the project is assumed) is more than 1 million tons. The general direction of pilot phase activities of AIJ in Latvia comprises the following four types of projects:

- Use of renewable energy sources—wind energy as well as biomass (16 projects).
- Environmentally adapted fuel use as energy resources by installation of small scale CHP (two projects).
- Energy efficiency projects in distribution side by rehabilitation of district heating systems (five projects).
- Energy efficiency improvement in end-users side by regulation of heat energy consumption and renovation of buildings (four projects).

Especially fruitful co-operation was established between Sweden and Latvia covering the main part of AIJ projects realized in Latvia. This co-operation started in 1992/1993 when the Swedish Government initiated *the Swedish Programme for an Environmentally Adapted Energy System in the Baltic Region and Eastern Europe* aiming at mitigation climate change through improvements of the energy systems in the form of energy efficiency measures and increased use of renewable energy sources and concentrating on investments in the municipal sector. Pre-studies for the perspective projects were undertaken by Swedish consultants in co-operation with local experts on all aspects of the project. The projects were financed by loans from SNEA. The Latvian local consulting company "EKODOMA B.V." carried out the monitoring of the projects. The following AIJ projects were implemented and CO_2 emissions reduction reached under the Swedish–Latvian co-operation:

- Fuel switching to renewable energy: 14 projects realized, total sum of CO_2 emissions reduction—82 900 metric tons annually.
- Energy efficiency projects—district heating network and buildings: eight projects realized, total sum of CO_2 emissions reduction—8590 metric tons annually.
- Combined projects on fuel switching to renewable energy and district heating network improvement: two projects realized, total sum of CO_2 emissions reduction—10 200 metric tons annually.

Thus the total reduction of CO_2 emissions, as the result of implementation of 24 AIJ projects in co-operation with Sweden, is estimated 101 790 tons annually. The specific CO_2 emissions reduction costs in these AIJ projects were in the range of 2.3–13.2 €/1 ton. Small

costs were reached in the projects which combined conversion of coal-fired boilers to biofuel (wood chips) with relatively high heat production by converted boilers as well as by decrease of investments due to local equipment use in the process of heat boiler plant reconstruction.

Latvia's and the Netherlands co-operation on small scale combined heat-power production development have also contributed to the AIJ development in Latvia. In year 1997, the AIJ project "Boiler Replacement and Cogeneration in Adazi and Lielvarde" in co-operation between Latvia and the Netherlands had been implemented. Two investments (~0.9 million € in total) in modern boiler house technology, using natural gas fired high efficiency and small cogeneration systems have been made in the Latvian municipalities of Adazi village and Lielvarde town.

Each of boiler plant consists of two heat boilers and one coop-generator: 3.6 MW of heat capacity and 0.35 MW of power capacity in Adazi, and 1.6 MW of heat capacity and 0.165 MW of power capacity in Lielvarde. The business activities also involved the transfer of technology in the fields of maintenance and operations. The project was planned as the demonstration project and was realized by the company EDON as project developer and owner, company EDON-Latvia as operator and company "EKODOMA B.V." as joint-implementation monitoring consultant. The total annual reduction of CO_2 emissions was estimated 3400 metric tons. It is important, the development of such cogeneration equipment in the frame of the given project was the first experience of intervention of modern small scale CHP technology by independent owner in the Latvian power market. The specific CO_2 emissions reduction costs of this project were relatively high, ~25 €/1 ton, which was significantly higher if compared with the heat boiler conversion projects, discussed before. Nevertheless it is rather artificially to make such comparison between conversion of heat boilers and establishment of cogeneration units because of only one cogeneration project has been realized as AIJ project. It should be noted that it is rather hard to evaluate impact of all factors which may influence the specific CO_2 emissions reduction costs of different projects to be realized in Latvia.

Latvia also has established fruitful cooperation with Germany on wind energy. A wind turbine park of 1.2 MW (2*600 kW) had been set up in 1995 in co-operation with the German government (construction and equipment was done by the company "Preussen Electra"), which produces approximately 1 GWh of renewable electricity annually. The total amount of CO_2 emissions reduction over 10 years period was estimated to be 12 579 metric tons. However, the relatively low (mainly due to location of the park) annual load has resulted in high operational costs of wind park [2].

Other group of AIJ projects in Latvia was related with rehabilitation of cities/regional landfills. The project "Solid Waste Management and Landfill Gas Recovery" was funded by Sweden, the World Bank and Global Environment Facility (GEF). The project aimed to demonstrate waste management of municipal solid waste by collecting generated methane and converting it into an alternate source for electricity/heating generation on the Getlini Waste Processing Plant, Riga district. Total costs of the project was estimated 23 million €. The first cell for biodegrading of waste and production of landfill biogas was put into operation in December 2001. The produced biogas is used for power production—and at the end of 2002 the energy production unit (5 motors-coo generators, each of 1 MW) started to operate. In year 2003 it was produced 17.887 million kWh electric power from which 8% was used for own needs, but 92% (16.481 million kWh) was sold to state joint stock company "Latvenergo".

3.3. AIJ in Lithuania

Since 1993, Lithuania has participated in the Swedish Programme for an Environmentally Adapted Energy System in the Baltic Region and Eastern Europe aimed at improving energy efficiency, the use of renewable energy resources, and reducing emissions hazardous to the climate and the environment. Lithuania benefited from this program, having nine projects with total investments worth more than USD 4 million on favorable terms. All projects aim to cut CO_2 emissions by converting heating plants to the use of bio-fuels, reducing heat losses in district heating systems and other measures [3]. All these projects are implemented with the support of Swedish National Energy administration. These projects are presented in the first group of projects in Table 2.

The second group of projects is addressed to the renewable energy resources. World Bank and Global Environmental Facility (GEF) initiated the Klaipeda Geothermal Demonstration Project in 1995 with support of Denmark. The total cost of the project is 25.72 million USD. The project of biogas demonstration plant in Rokai was developed using the support from Denmark. The AIJ projects supported by Denmark are the following:

- Wood fuel boiler (4 MW) in Moletai.
- Straw burning boilers with total capacity of 10 MW.
- Five straw boilers for heat production in Pasvalys.
- 1.2 MW boiler in Silute.
- 0.34 MW capacity boiler in Jonava.
- Pilot projects on peat usage.
- Biogas plants.
- Demonstration plant (0.3 MW) in agricultural association in Kaunas.
- Plant (1.5 MW) processing "SEMA" alcohol production waste in Panevezys.
- Plant (0.3 MW) processing discharge of treatment equipment in Utena.
- Plant (2 MW) in water treatment equipment in Kaunas.

Table 2
AIJ projects implemented in Lithuania with Sweden

Project-type	Capacity/saving	Calculated CO_2 emission reduction t/year	Commissioning date
Birzai, BC	6 MW	11300	January 1994
Kazlu Ruda, BC	3 MW	3900	February 1995
Baisogala, BC	3 MW	6000	December 1995
Ziegzdriai, CP	0.5 MW/7500 MWh	2400	March 1996
Ukmeges "Vienybe"	6 MW	9700	April 1996
Varena, BC	8 MW	19500	May 1996
Stasiunai, DH	1020 MWh	300	February 1997
Sventupe, CP	1.5 MW/1050 MWh	1900	March 1997
Ignalina, CP	6MW/1000 MWh	7500	March 1998
Didziasalis, CP	3 MW/14 500 MWh	6300	December 2001
Total	37 MW/9550 MWh	68770	

Note: BC—boiler conversion.DH—district heating network renovation.CP—combination of BC and DH.

- Plant ($\approx$1 MW total electricity capacity) in UAB, "ROKISKIO SURIS".
- Installation of recirculation system in the treatment pool.
- Refurbishment of heat distribution network in rehabilitation hospital in Palanga.
- Demonstration geothermal energy plant (40 MW) in Klaipeda.

There are no JI projects already registered in Lithuania. The recent proposal developed by France consists of seven projects aiming to obtain JI status. The "Biomass Energy Portfolio in Lithuania" is a bundle of renewable energy and energy efficiency projects implemented in seven district heating plants across western Lithuania operated by the company UAB Litesco (Fig. 1). The projects aimed at a partial substitution of fossil fuels by wood fuel and at energy efficiency improvement of the plants and their heat distribution grids. The wood fuel substitutes liquid fossil fuels (heavy fuel oil, shale oil) and natural gas. The level of development of the individual projects in the portfolio varies. Five of the seven plants switched to wood fuel from December 2001 till November 2002. The last two plants are expected to switch to wood fuel in 2004.

After completion of this JI project portfolio, the total output of the wood boilers will be 29 MW. The yearly heat production from bio-fuel will amount to ca. 190,000 MWh. The renewable heat will serve more than 125,000 inhabitants. As a whole, the portfolio represents the largest biomass fuel-switch activity in Lithuania and it is expected to reduce GHG emissions by ca. 51,000 t CO_2e per year, i.e. by ca. 255,000 t CO_2e over the Kyoto

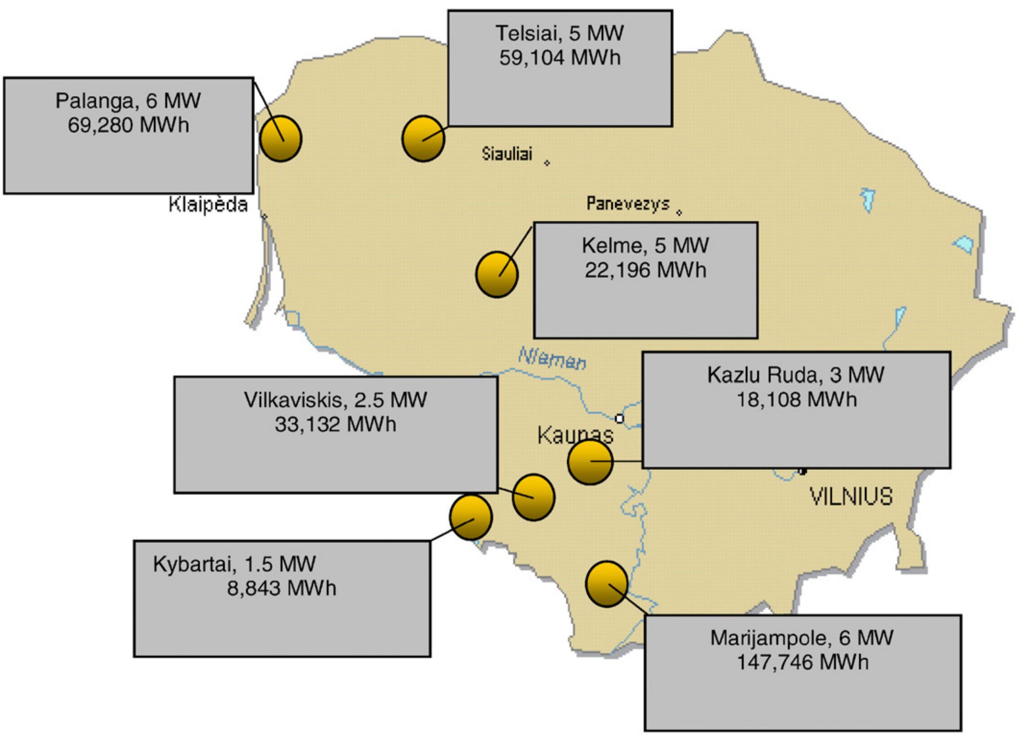


Fig. 1. Location of the district heating plants and the thermal output of the new wood boilers proposed in Biomass energy portfolio for Lithuania.

commitment period 2008–2012. The total emissions reduction over the whole project lifetime (15 years) is expected to be ca. 765,000 t CO_2e.

4. Institutional and legal framework for climate change mitigation and JI

The institutional structure for climate change policy implementation is quite similar in Baltic States though some differences exist. The main responsible institution in all countries is Ministry of Environment. In Lithuania the main functions of implementation of climate change mitigation policy was passed to Lithuanian Environment Investment Fund. In Estonia the Environmental Investment Centre which is carrying the similar functions as Lithuanian environmental investment fund in Lithuania is not engaged to the same extent in climate change mitigation policy in Estonia.

Only Estonia has recently adopted climate change mitigation policy document: Greenhouse Gas Emission Reduction Program for 2001–2010. Lithuania's climate change mitigation strategy was adopted in 1996 and Latvia's National Climate Change Mitigation Policy Plan was adopted in 1998. These climate change mitigation policy documents can be treated more than historical one. However Latvia has included particular chapter on climate change mitigation actions in the mentioned above new National Environmental Policy Plan. New Latvia National Climate Change Policy to be adopted in the end of year 2005.

Phare project finalized recently in Lithuania include some important recommendation for the strengthening of Lithuanian institutional capacity in climate change mitigation area and proposing new insights into climate change mitigation policy development in Lithuania but of course this document cannot replace the National climate change mitigation strategy. Therefore amendments of national climate change mitigation policy documents are necessary in Baltic States.

The main policy documents which can be used for the analysis of climate change mitigation policy in Baltic States are National communications to UNFCCC. Estonia and Latvia have submitted three National communications to UNFCCC [4] and have to start preparation of fourth national communications to be submitted to UNFCCC secretariat in 2006. Lithuania has submitted just two national communications. All Baltic States have developed and submitted National allocation plans to EC [5].

Though climate change mitigation policy is included among priorities in recently prepared National sustainable development strategies one can notice that just Estonia has recently adopted Greenhouse Gas Emission Reduction Program for 2001–2010. Lithuania's climate change mitigation strategy was adopted in 1996 and Latvia's National Climate Change Mitigation Policy Plan was adopted in 1998.

4.1. Institutional and legal framework for JI in Estonia

In 2001 the Ministry of Environment of Estonia prepared the *National Program for the Reduction of Greenhouse Gases Emissions for the year 2003–2012* which was approved by Estonian Government in April 2004. The Program gives an overview of the Kyoto Commitments and analyses the implementation strategy and action measures for Estonia. A special attention has given to strategy, structure and costs of GHG emission trading and JI projects.

A government committee on the implementation of the Climate Convention was established in Estonia in January 1995. Its task is to facilitate strategic mechanisms for the reduction of GHG emissions, such as programs of JI, and the preparation and launching of its pilot phase activities, or AIJ. The Commission must develop alternative strategies to be targeted in further work on climate issues and create a country specific implementation mechanism acceptable to potential donors among the Annex I countries. The Committee's obligations were fixed and the responsibilities shared between several institutions, amongst which the Ministry of Environment has the leading role. The Committee's mandate is to select the most suitable among the prospective country projects to be launched with the help of donor countries. The Committee should determine the main goals in the international negotiating process for the reduction of GHG emissions.

Estonia has good potential for cooperation with the main donor countries in Europe, especially with the Nordic countries. The Committee nevertheless lacks an efficient working institution such as a Secretariat on JI implementation or a JI Project Preparation Facility. Nor does it have a Steering Committee of any kind. Consequently, up to the present time the Government has lacked an appropriate system of identification and verification of future JI activities.

The Government Committee has not done any real work to date; nor has it undertaken any significant measures to form a climate policy in Estonia. Other institutions have actually taken its place in developing relevant activities and programs. Recently an Inter-Ministerial Joint Implementation Steering Group was created on the basis of an NGO, the Stockholm Environment Institute Tallinn Centre. The primary aim of the JI Steering Group is to bring together top-level decision-makers from the Ministry of Environment and the Ministry of Economic Affairs, the main agents in implementing the Climate Convention. The Steering Group has identified its main objectives, which include: building institutional capacity for future JI pilot phase projects; putting principles and regulations in the form of appropriate documentation for the guidance of potential Annex I donor countries; and outlining the procedures for identifying and approving potential JI projects and activities. Another important task includes setting up a nationwide, prioritized list of JI projects and activities to cohere with the National Environmental Action Plan. The general target of the JI Steering Group is the preparation of Estonia for further JI activities and emissions trading.

The day-to-day work in the field of climate change and abatement of GHG emissions is concentrated between two ministries, the Ministry of Environment (MoE) and the Ministry of Economic Affairs (MoEA). The Energy Department within the Ministry of Economic Affairs is responsible for policy issues including energy efficiency, and thus indirectly the reduction of GHG emissions. Currently, measures to reduce CO_2 emissions by improving energy efficiency fall under Estonia's Energy Act. The Act confers upon the Energy Market Inspectorate the authority to organize cooperation among energy traders for the conservation of energy and the environment (State Gazette 1, 1998, 71, 1201, Section 26). Better cooperation between the two key ministries is expected to increase overall efficiency in the area of GHG emissions reduction.

The Energy Conservation Division within the MoEA was established in order to coordinate the conservation of energy and the environment in Estonia. At present, the Energy Act and the Construction Act are in the process of amendment to cover the targets set in the European Union Directive 93/76/EEC. An expert group at the MoEA has established the Energy Conservation Program (draft from May 24, 1999), which was

adopted by the Government in January 2000. The MoEA determines the role of different institutions and ministries in the implementation of the Energy Conservation Program.

All important strategic issues regarding energy production and consumption at the state level are thus in the competence of the Ministry. These include large-scale heat and power production, which pose the biggest problems regarding GHG emissions. Energy planning at the local level is also coordinated by the same institution. The Energy Department manages the Energy Conservation Fund, a key institution in implementing governmental policy on energy efficiency and related climate issues. The Fund is used to finance general studies on energy efficiency, as well as some small-scale pilot projects in energy saving.

There is no special institutional unit in the MoEA that deals directly with climate issues related to energy. However, AIJ projects launched up to this point could in principle belong to Energy Department by virtue of their content. But at present their implementation and coordination are organized via the MoE.

The Ministry of Environment is the primary institution responsible for the Framework Convention on Climate Change and all other climate related issues. Within the ministry, international climate issues are coordinated by the Department of Foreign Affairs. A formally established position exists for the so-called "local focal point"—an individual who carries out all responsibilities concerning climate change related work currently done in Estonia. It is also the duty of the local focal point to represent Estonia in the Conferences of Parties, attend all climate negotiations, and have an overview of all JI pilot phase projects launched in this field, coordinating the JI project proposals, selection and verification. In principle, the yearly reporting on AIJ project results to the Convention Secretariat may also fall within their scope of responsibilities. The "local focal point" also serves as an advisor to the minister in all questions related to the UN Framework Convention on Climate Change.

In order to form a reliable institutional and professional base for future JI projects, the AIJ unit has recently been established in the Department of Environmental Management and Technology at the MoE. Its function is to maintain records on JI pilot phase projects already in progress, and to help select, verify and launch future AIJ projects. This unit is responsible for reporting yearly to the UNFCCC Secretariat on the GHG emissions reductions resulting from AIJ projects. It also works toward fulfillment of Estonia's commitments in this area according to the Kyoto protocol. The Department of Environmental Management and Technology deals with all issues related to the atmospheric environment; it was therefore decided to place the AIJ projects under its jurisdiction.

To date, Estonia's main donor country is Sweden, long experienced in the field of energy efficiency and conservation. Denmark has also supported several fuel switch projects and a solar-based energy conservation project in Põlva. However, the Danish projects, which are in principle grant projects, are not registered in the UNFCCC AIJ Register.

As the donor country representative, the Swedish Energy Administration, STEM, is continuing its assistance in monitoring and reporting the projects in five host countries. Experts from STEM, as well as the Swedish consultancy company AF Energikonsult provided guidance in methodology. Work was also supported by the host countries' energy efficiency development network, the Regional Environmental Center (REC) under the PHARE Program, and other research & development institutions.

The responsibilities of the AIJ unit in the Ministry of Environment will encompass coordination of the entire effort, including the international negotiating process, contracting, etc. Full responsibility for the enforcement and monitoring of various JI pilot phase projects will also be transferred to the host. Hopefully, the number of experts from the MoEA currently involved in surveying the projects will increase. Their knowledge on matters of energy conservation and CO_2 emissions reduction is needed to increase the overall efficiency of project enforcement and ensure smooth implementation.

It has been agreed between the donor and host country representatives that new AIJ projects will have to follow a given format of systematic monitoring and reporting, both to the donor and particularly to the newly established AIJ coordination unit in the host country's Ministry of Environment. The AIJ unit will be the center for JI pilot phase coordination, an information resource for future potential investors and donors, and the institution responsible for working out AIJ criteria and procedures. Its responsibilities must also cover the selection of future projects, verification, monitoring and reporting to the Convention Secretariat.

Other institutions also deal with particular problems related to climate change, although they may not be engaged in the daily work related to climate policy or JI. Within the jurisdiction of the Ministry of Environment, the Estonian Institute of Meteorology and Hydrology participates in the work of the World Meteorological Organization. It is likewise affiliated with the Intergovernmental Panel on Climate Change, with a permanent representative. This links the work carried out in Estonia with international climate-related institutions and vice versa. Estonia receives direct feedback from those authorities.

As the accounting of emission reduction quantities is carried out on project basis, nevertheless, initiating of a FM project presumes conclusion of an agreement between governments of parties—memorandum of understanding. Estonia has signed the memorandums with three countries:

- With Finland—on 17 December 2002.
- With The Netherlands—on 9 September 2003.
- With Denmark—on 25 September 2003.

4.2. Institutional and legal framework for JI in Latvia

According to the Cabinet of Ministers regulations, the Ministry of Environment (MoE) is responsible for activities related to the fulfillment of the UNFCCC requirements. It also leads all activities related to co-ordination and monitoring of the existing AIJ projects and reporting to UNFCCC.

The main role in overseeing Latvian climate policy is played by the MoE but many other institutions are also involved. The MoE is responsible for Latvia's obligations under the UNFCCC. MoE co-ordinates signing the Memorandum of Understanding with each country with which Latvia intends to participate in AIJ projects. So far agreements have been signed with Sweden, the Netherlands and Germany. MoE also has to endorse each individual project, project reports to the UNFCCC, and the National Communications. MoE has established in-ministerial working group that will co-ordinate decision taking about JI project in the future. Latvian Environmental Agency (LEA) is responsible for data collection for GHG and other emissions monitoring and reporting. Under competence of LEA is carrying out given tasks by the state programs and international

agreements and implementation of international obligations connected with environmental pollution testing.

The Energy Department (ED) of the Ministry of Economy is responsible for the development of the national policy for the energy sector development. The Latvian Development Agency's (LDA) ED has helped several Latvian municipalities to develop business plans for the Swedish AIJ projects and also is responsible for the selection of projects for including in the Public Investment Program. Department has very close contacts with municipalities and also technical expertize for potential energy projects assessment. LDA Energy Department for analyses of energy and environment system use MARKAL optimization model, which is a quit widely distributed around the globe the world (also in neighboring countries like Scandinavia countries, Estonia). This gives opportunity for regional analyses, like ET, electricity trade, natural gas, etc.

Municipal governments and district heating utilities are involved as project hosts and implementers. So far they have not been active in potential JI project initiation phase. NGOs have been actively involved in climate change policy recently, working out an independent assessment of AIJ phase and being involved in the preparation of the third UNFCCC National Communication.

Information exchange among these many institutions is developing, especially between the Ministries and project implementers on the municipal level. Municipalities that may be interested in future projects do not know whom to contact, and so far not much information in Latvian is available explaining the AIJ/JI mechanism for potential project beneficiaries. Project selection and monitoring procedure is still weakly co-ordinated between Ministries or other involved institutions. So far they mainly have been investors driven AIJ projects. Due to the fact that the main attention is paid to projects related to the energy sector, also the Ministry of Economy must have an important role in the process.

Latvia is the only from Baltic States which has developed comprehensive strategy for JI. In cooperation with the Netherlands two documents of background analysis had been worked out—Joint implementation action plan for Latvia 2001–2004 [6] and Joint implementation policy in Latvia [7]. The objective of these documents was to support the Latvian Government in the development and implementation of a national policy for JI by providing the required background information for decision-making and by providing recommendations for policy measures and implementation actions. The JI policy background analysis document contains an overview of the existing climate change policy framework in Latvia as well as detailed analysis of JI potential in Latvia. It also includes analysis of potential for JI projects in Latvia, benefits and risks, as well as experience from AIJ projects and detailed evaluation of criteria for project selection and credit sharing. The policy document covers 5 years (2000–2005), although of course the first commitment period 2008–2012 has been considered when assessing the impact of the policy. The report evaluated the alternative strategies and the recommendations have been given for policy targets, priorities and measures. The action plan covers (1) general requirements for implementation JI regardless of donor countries and specific schemes, and (2) the specific requirements for JI with the Netherlands under ERUPT tender proposed by the government of the Netherlands and the Prototype Carbon Fund, which for the moment were the only JI project implementation schemes that offer real project realization.

The general Conception for implementation of JI projects in Latvia was adopted by the government in 30.04.2002; this Conception has accepted the JI projects' implementation according the scheme B2 stating that Latvia will participate in JI actively—Latvian specialists will identify and will prepare the potential JI projects and will organize competition for perspective investors to implement them.

On 29.10.2002 the Government of Latvia approved national "The Implementation Strategy of JI projects in the frame of UN FCCC Kyoto protocol for the period 2002–2012" [8]. The given document states the priority sectors for JI projects in Latvia:

- CO_2 emissions removals by forestry.
- Biogas production, collection and use for energy production in municipal waste landfills.
- Biogas production, collection and use for energy production in livestock farms.
- Replacement of fossil fuels by renewables including hydro energy, sun energy, geothermal energy as well as biofuels.
- Energy efficiency increase in industry.
- Use of new environmentally friendly and efficient technologies in energy sector.

The mentioned document states that the investor countries are interested for the projects which JI component is not less then ~1.5 million €. As this JI component usually constitutes 10–20% from the total costs of the particular project, it can be expected that implementation of JI projects will attract 5–10 times larger total financing. The document emphasizes that the national climate mitigation policy is in the sector of competence of the government (the Cabinet of Ministers) because climate issues are not only environmental problem but is strongly interlinked with other branches of national economy. To approve the projects assigning them the status of JI projects and to decide on signing the contract agreement among international partner, Latvian partner and international partner's government the national JI Projects Commission is established involving representatives for Ministries of Economy, Finances, Environment, Regional development, Agriculture, Transport, Foreign Affairs as well as non-governmental organizations. The strategy stated the establishment of special JI Projects Group in the frame of responsible ministry—Ministry of Environment as well as the authorized certification institution responsible for examination and approval of project's base scenario and certification of emission reduction units created by the project. However, due to lack of financial resources the JI Projects Group was not established up to autumn 2004 (only from 01.10.2004 it starts to work, according the restructuring plan of the Ministry of Environment, the new department of the ministry—the Department of Climate Change and Renewable energy sources) and thus, as stated by the Report on the realization of JI Implementation strategy (published by the Ministry of Environment 23.08.2004) it has created the delay in preparation of the guidelines for JI projects approval, monitoring and examination.

On the end of Summer 2004 Latvia has already signed two international agreements—Memorandums of Understanding regarding bilateral co-operation in the frame of Kyoto protocol and reduction of GHG emissions:

(1) with Denmark (signed 27.10.2003 by the governments), and
(2) with Austria (signed 11.07.2003 by the Ministries of Environments).

4.3. Institutional and legal framework for JI in Lithuania

The main legal act in Lithuania dealing with Kyoto commitments and application of FMs is The Order "On the Approval of the Inter-institutional Allocation of Functions Relating to the Joint Implementation Mechanism for the Implementation of the UN FCCC Kyoto protocol, Strategic Directions for the Implementation of this Mechanism and Recommendations for the Realization of Joint Implementation Projects" of the Ministry of Environment and Ministry of Economy of the Republic of Lithuania that is currently being prepared specifies the criteria and priority areas for JI projects. It is foreseen, that JI projects will be implemented which would reduce GHG emissions in the sectors of economy not covered by the emission-trading scheme.

The Order "On the Approval of the Inter-institutional Allocation of Functions Relating to the Joint Implementation Mechanism for the Implementation of the UN FCCC Kyoto protocol, Strategic Directions for the Implementation of this Mechanism and Recommendations for the Realization of Joint Implementation Projects" of the Ministry of Environment and Ministry of Economy of the Republic of Lithuania that is currently being prepared specifies the criteria and priority areas for joint implementation projects. It is foreseen, that joint implementation projects will be implemented which would reduce GHG emissions in the sectors of economy not covered by the emission-trading scheme. The following types of JI projects are possible:

- Introduction of technologies based on production of electricity and heat (cogeneration) from renewable energy sources (wind and geothermal energy, solar energy, biomass, hydro-power, etc.).
- Replacing one type of fuel (in energy or heating sector) with renewable and/or less pollutant fuels.
- Increasing energy efficiency, including energy saving methods.
- Production of energy from methane that is generated in agriculture and other sectors of economy and from gas obtained during oil production.
- Planting of forests and other activities related to the development and protection of greenhouse absorbents and accumulators.
- Reducing pollutant emissions from transport vehicles in major cities of Lithuania.

Lithuania was going to sign the memorandums of understanding with Sweden and Denmark in 2003 but these agreements have not been signed yet. The situation with JI projects in Lithuania is very unclear. Lithuania has not signed memorandums with any country. Though as a Baltic Sea State Lithuania participates in the Baltic Sea Region Energy Co-operation (BASREC) and in January 2003 the BASREC Ad Hoc Group on Climate Change issued a Handbook on procedures for JI in the Baltic Sea Region there is no regulations for JI procedures approved in Lithuania. There is no JI implementation strategy adopted in Lithuania, which has to create the foundation for JI policy targeted at attraction of additional investment for implementation of environmentally friendly and energy efficient projects. In order to be able to fully benefit from the advantages offered by JI, it is necessary to create a permanent institutional structure that would study potential projects, attract investments, approve, register and verify projects, register and transfer ERU. This strategy should include the main directions of Lithuanian policy in JI field. Pilot project pipeline in the following sectors are necessary: energy (fuel supply: gas flaring,

transportation losses), power (fuel switching: HFO to gas and biomass conversion; renewable energy: solar, wind, biomass, hydro, geothermal; co-generation; efficiency gains (improved processes, technology; T&D losses); transport (alternative fuels (biofuels, LPG, natural gas), traffic control systems); forestry and households and industry (Demand-Side Management; solid waste management: methane recovery; co-generation).

5. BASREC testing ground facility

Baltic Sea Region Energy Cooperation (BASREC) exists since 1999 and brings together the 11 countries around the Baltic Sea (Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Norway, Poland, Russia, Sweden) and the European Commission. BASREC offers a unique regional forum, in which policies and projects of regional and broader significance can be prepared and implemented. The European Commission is a party of BASREC since its inception, and played a leading role in the creation of BASREC, together with the Nordic Council of Ministers, the main financier of BASREC.

In September 2003, the Testing Ground Agreement [9] was signed in Göteborg by seven of the BASREC countries: Denmark, Finland, Germany, Iceland, Lithuania, Norway and Sweden. Subsequently, three further countries, Estonia, Latvia and Poland have signed the Agreement. In November 2004, Russia ratified the Kyoto protocol on Climate Change. This event has led to the entry into force of the Protocol globally in February 2005. At the regional level, it has also opened the door for Russia to join the Testing Ground Agreement.

The Parties agree to establish a Testing Ground for the Baltic Sea Region to gain experience from and facilitate the use of JI under Article 6 and Emissions Trading (ET) under Article 17 of the Kyoto protocol and to implement projects generating emission reductions prior to and during the commitment period commencing in 2008, in order to reduce anthropogenic emissions of GHGs cost-effectively. Objectives of Testing Ground Cooperation:

(a) to build capacity and competence to use the Kyoto mechanisms and promote common understanding of concepts, rules and Guidelines for use of the FMs of the Kyoto protocol, to promote realization of high quality projects in the energy sector generating emissions reductions;
(b) to gain experience with the JI mechanism under the Kyoto protocol in the energy sector, especially with projects in the fields of energy saving, energy efficiency, fuel switching in combination with energy efficiency or saving, and renewable energy sources;
(c) to develop methods and procedures in conformity with the rules and guidelines of the Kyoto protocol with a view to ensuring the environmental integrity of projects;
(d) to collaborate in addressing administrative and financial barriers and the level of transaction costs, especially regarding small-scale JI projects;
(e) to facilitate generation, ensure issuance and transfer of ERUs and AAUs related to or accruing from JI projects and Emissions Trading; and
(f) to implement projects early and offer credit for emission reductions prior to 2008.

Participation in the activities on the Testing Ground for the Baltic Sea Region is open to public and private legal entities in Baltic Sea Region States that are Parties to this

Agreement. The Parties encourage business, industries, energy utilities, financial institutions, regional and local authorities to take an active role in identification and implementation of JI projects within the framework of the Testing Ground. Such projects are to be carried out in the Baltic Sea Region.

In order to foster and contribute to the implementation of JI projects and to fulfill the Objectives of this Agreement, a Testing Ground Facility (TGF) is being established. The TGF will serve as a multilateral financing instrument for JI projects under this Agreement. All Projects implemented under this Agreement shall be carried out in the Baltic Sea Region and shall be approved by the Investor Party and Host Party in accordance with the Kyoto protocol and the relevant rules, decisions and guidelines. A written approval shall be issued either by the TGF and the Host Party or by the Investor Party/Parties and the Host Party. The Nordic countries and Germany collaborated to put into place a TGF for credit payments. The budget of the Facility is 15 million €, whereby it is anticipated that the involvement of industry in regional climate change projects will lead to a supplement to the Facility.

The co-operation within the Testing Ground shall focus on energy-related climate change mitigation projects especially in the fields of energy saving, energy efficiency, fuel switching in combination with energy efficiency or saving and renewable energy sources. The Testing Ground shall also be open to the projects implemented by legal entities in Parties without financing through the TGF, under the precondition that they are compatible with this Agreement and contribute to the objectives of this Agreement by participating in capacity building and exchange of information. After the written approval has been issued, Participating projects shall be registered with the Testing Ground Committee to be established under Article 11 of Testing Ground Agreement.

It is recommended that all the projects to be implemented under this Agreement to the extent appropriate follow the guidance given in the BASREC Regional Handbook on Procedures for JI in the Baltic Sea Region developed for the Testing Ground of the Baltic Sea Region [10].

The first meeting of the Testing Ground Committee was held on 27 April 2005. With this event, the Testing Ground Agreement has all the elements in place to operate well during the next period, 2006 to 2008. This is a critical time for the Testing Ground, as its leadership role will be most important in this period.

The period until 2008 will be of crucial importance for the entire trading scheme globally and at EU level, as those players intending to indulge in trading must prepare for the commitment period, 2008–2012. The value of the Testing Ground will also be most intense during this period, in particular to facilitate the start-up of projects.

6. The main challenges for JI in Baltic states

The key problem confronting all three Baltic States appears to be the lack of sufficient institutional capacity to implement the JI pilot phase. There is also a lack of monitoring and reporting experience. In general, Baltic States as other host countries anticipate receiving assistance in institution building from donor countries. National governments that wish to engage in flexibility mechanisms also need to make considerable investment in building the national institutional and policy infrastructure to support project-based flexibility mechanisms. Without an institutional infrastructure in place, JI and CDM

projects are unlikely to become cost-effective mechanisms for emissions reduction, technological innovation, and economic growth. This infrastructure would need to have clear operational selection and approval criteria integrated into local and national development objectives; streamlined institutional procedures; transparency and public oversight and participation; stable and favorable investment climate for *both* domestic and foreign investors; and finally, local capacity for baseline and additionality assessment and project validation.

Another challenging issue is to ensure the core of JI: baselines, additionality and credit-sharing. It is necessary to set a set of common rules, or at least guidelines on baseline assessment. Case studies illustrate that for many AIJ projects, selecting and evaluating baselines consumed considerable time and effort and thus generated high transaction costs in all Baltic States. In addition, discrepancies in baseline assumptions were frequent and led in turn to high levels of uncertainty. The lack of local expertize in baseline assessment not only added to the uncertainty but also made the AIJ/JI benefits controversial. Therefore guidance and/or a common set baseline rules is needed to reduce uncertainty and transaction costs. The BASREC JI handbook should be used for the common baseline rules. COP should create and adopt an independent mechanism for baseline review and validation. Such a mechanism should also identify and train experts in recipient countries.

The AIJ implemented in Baltic States raised two particular issues which should be considered in developing the rules for the assessment of project additionality: whether commercially viable projects or projects implementing existing legislation (e.g., previously enacted air pollution standards) should be considered additional under the flexibility mechanisms rules. The COP should specify what criteria are useful in defining additionality, and especially whether to prohibit projects in the "commercially viable" and "existing legislation" classes. If a "commercially viable" or "existing legislation" ban is not adopted by the international community, there remains a need to clearly define a framework to reduce uncertainty in determining the "additional" component of a project that either makes economic and financial sense or achieves the objectives of existing national legislation.

Although the AIJ pilot does not allow emissions reduction credits to be applied to the Kyoto protocol targets, the subject did arise in the region. The implemented AIJ in Baltic States suggest concerns over two credit-sharing principles: how to share credits between the investor and the host, and how long a project should be able to produce credits. Another issue—duration of credit-sharing agreements—has to reconcile two conflicting interests: those of the investors, interested in generating credits throughout the life of a project; and the host country, whose future commitments are unclear (for Annex I countries first commitment period expires in 2012). A detailed assessment of experience in the pilot AIJ phase and guidance developed by the COP can help governments in weighing the benefits and liabilities in the credit-sharing agreements they are likely to form. An overall conclusion from the AIJ experience in Baltic States is that the level of uncertainty is so high that governments, investors, and NGOs are cautious in their assessment and/or involvement in AIJ. Stakeholder caution is likely to increase in a crediting regime, and therefore uncertainties and bottlenecks should be addressed to support effective JI programs. The COP should consider and set clear rules for assessing project baselines and additionality before entering into crediting regimes.

Baltic States before entering EU were attractive host countries for AIJ. However since the EU membership and the implementation of EU emission trading and linking directives the situation with regards of JI projects may change in Baltic States. As Baltic States are potential host countries for JI, the developed countries will undertake JI and CDM in countries outside the EU zone because in internal EU GHG market which includes Baltic States the price of generated ERUs and tradable emission permit will be the same. Therefore the incentives of project developers to launch JI inside EU would reduce. Welfare graphical analysis of inerlinkages between three market based GHG emission reduction tools indicated that implementation of linking directives may have a detrimental effect on the deployment of renewable in Baltic States [11,12]. The negative impact of linking directive can be mitigated by the implementation of European-wide GCT scheme, which will generate additional revenues to RES-E producers in EU and Baltic States as well [13,14].

7. Conclusions

The institutional structure for climate change policy implementation is quite similar in Baltic States though some differences exist. The main responsible institution in all countries is Ministry of Environment. In Lithuania the main functions of implementation of climate change mitigation policy was passed to Lithuanian Environment Investment Fund. In Estonia the Environmental Investment Centre which is carrying the similar functions as Lithuanian environmental investment fund in Lithuania is not engaged to the same extent in climate change mitigation policy in Estonia.

Only Estonia has recently adopted climate change mitigation policy document: Greenhouse Gas Emission Reduction Program for 2001–2010. Lithuania's climate change mitigation strategy was adopted in 1996 and Latvia's National Climate Change Mitigation Policy Plan was adopted in 1998. These climate change mitigation policy documents can be treated more than historical one. However Latvia has included particular chapter on climate change mitigation actions in the new National Environmental Policy Plan. Besides that Latvia is the mostly advanced in developing legal framework for JI including established strategic priorities in future JI development.

Estonia has hosted 21 AIJ project on biomass conversion supported by Sweden. Estonia also hosted four JI supported by Finland on biomass conversion. Two wind farm projects under JI scheme was implemented in Estonia with support of Denmark and Netherlands.

Latvia has hosted 24 AIJ (14 projects on biomass conversion and 10 projects on energy efficiency improvements in heat supply and buildings) supported by Sweden. Ambitious wind park project implemented under AIJ scheme in Latvia was supported by Germany. Denmark implemented two projects in Latvia on biomass conversion and small scale CHP development. Solid Waste Management & Landfill Gas Recovery AIJ project in Latvia was funded by Denmark, World Bank and GEF.

Though Lithuania has not signed the memorandum of understanding with any other country there were more than 30 projects implemented according AIJ scheme in Lithuania. Lithuania hosted 11 biomass conversion projects implemented according AIJ scheme by Sweden support. Fifteen biomass conversion projects were implemented in Lithuania with Denmark support. Geothermal demonstration plant was implemented using the support from Denmark, World Bank and GEF. The package of seven biomass conversion projects under JI scheme was submitted by France.

The case studies on AIJ experience in the Baltic States illustrate the importance of good governance to successful market programs. The Baltic States like other transition economies wishing to engage in JI will need to increase the attention and resources they give to implementing the Kyoto protocol. Specifically, countries must pay more attention to making themselves attractive targets for investors seeking cost-effective CO_2 reduction opportunities and to integrating JI into their overall development goals.

The case studies on AIJ experience in the Baltic region illustrate the importance of good governance to successful market programs. Without an institutional infrastructure in place, JI and CDM projects are unlikely to become cost-effective mechanisms for emissions reduction, technological innovation, and economic growth in Baltic States.

Participation in BASREC Testing Ground Cooperation is a valuable experience for Baltic States. BASREC Regional Handbook on Procedures for JI in the Baltic Sea Region developed for the Testing Ground of the Baltic Sea Region is the main harmonized document for Baltic States which can be used for developing emission baselines, ensuring the additionality criteria and credit-sharing.

The EU membership and the implementation of EU emission trading and linking directives will have the impact on development of JI in Baltic States. The developed countries will undertake JI and CDM in countries outside the EU zone because in internal EU GHG market which includes Baltic States the price of generated ERUs and tradable emission permit will be the same. Therefore the incentives of project developers to launch JI inside EU would reduce. The implementation of European wide green certificate trading system would reduce negative impact of linking directive on JI development in Baltic States.

References

[1] Ministry of Economic Affairs and Communication of Republic of Estonia. The long-term National development Plan for the Fuel and Energy Sector, Tallinn, 1997.
[2] Ministry of Economy of Republic of Latvia. National energy programme, Riga, 1997.
[3] Lithuanian Ministry of Economy of Republic of Lithuania. National energy strategy, Vilnius, 2002.
[4] United Nations Framework Convention on Climate Change (UNFCCC). 2001. Third National Communications to the Conference of the Parties under UNFCCC: Estonia, Latvia, Lithuania. Available online and last accessed on April 2005 at: http://unfccc.int/resource/natcom/nctable.html
[5] Emissions trading—National allocation plans. Estonia, Latvia, Lithuania. http://europa.eu.int/comm/environment/climat/emission_plans.htm. Accessed on 30 December 2004.
[6] Ministry of Environmental Protection and Regional Development. Joint implementation action plan for Latvia 2001–2004. Riga, 2001.
[7] Ministry of Environmental Protection and Regional Development. Joint implementation policy in Latvia, Riga, 2001.
[8] Ministry of Environment. JI strategy 2003–2012, Ryga, 2002.
[9] Agreement on a Testing Ground for Application of the Kyoto Mechanisms on Energy Projects in the Baltic Sea Region, 2003.
[10] BASREC Regional Handbook on Procedures for Joint Implementation in the Baltic Sea Region, 2003.
[11] Criqui P, Kitous A. KPI Technical Report: Impacts of linking JI and CDM credits to the European Emission Allowance Trading Scheme. KPI, 2003.
[12] Jempa C. The EU emission trading scheme (ETS): how linked to JI/CDM? Climate Policy 2003;3:89–94.
[13] Jensen SG, Skytte K. Simultaneous attainment of energy goals by means of green certificates and emission permits. Energy Policy 2003;31:63–71.
[14] Morthorst PE. Interactions of a tradable green certificate market with a tradable permits market. Energy Policy 2001;29:345–53.

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